

32.7. COMPARISON BETWEEN T,T-MUCONIC ACID, S-FENILMERCAPTURIC ACID AND URINARY BENZENE FOR THE BIOLOGICAL MONITORING OF EXPOSURE TO LOW BENZENE LEVEL

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Benzene is a human carcinogen and a ubiquitous pollutant of outdoor and indoor air. For the definition of exposure to low benzene level, and for the evaluation of health risk posed by this exposure, the identification of suitable, specific and sensible biological markers is needed. This research compared the capability to discriminate the exposure of three biomarkers of benzene: t,t-muconic acid, and S-phenylmercapturic acid and urinary benzene. Gasoline filling attendants (N = 78), urban policeman (N = 77) and subjects working in urban environment, designed as controls (N = 58) were recruited for the study. Air and urine samples (pre and end shift) were collected for each subject. Smoking habit was investigated by the use of a questionnaire and by determination of urinary cotinine. This study was part of a larger European investigation on human exposure to low level of benzene and its potential effects. Median personal exposure to benzene during the work shift in filling attendants, urban policeman and controls was 61 (44 - 478), 22 (9 - 316) and 6 (2 - 115) $\mu\text{g}/\text{m}^3$, respectively. Significant differences were found among groups. End-shift t,t-muconic acid was 73 (5 - 518), 129 (5 - 909) and 40 (5 - 1089) $\mu\text{g}/\text{L}$. End-shift S-phenylmercapturic acid was 6.6 (0.2 - 25), 5.9 (0.2 - 14) and 5.0 (0.2 - 14) $\mu\text{g}/\text{L}$. End-shift urinary benzene was 603 (42 - 5111), 220 (25 - 4246) and 154 (15 - 4615) ng/L . A significant correlation was found between urinary benzene, but not t,t-muconic acid or S-phenylmercapturic acid, and personal exposure to benzene. All the investigated biomarkers were strongly influenced by cigarette smoking that resulted an important source of personal exposure to benzene, and whose importance could overcome that of the occupational exposure. The comparison among t,t-muconic acid, S-phenylmercapturic acid and urinary benzene showed that, in the investigated range of exposure, only urinary benzene was useful to discriminate the airborne exposure.